Guerrin F., Paillat J.-M., 2010. Collective animal manure management simulation and environmental impact assessment. 24th European Conference on Operational Research (EURO XXIV), Lisbon (Portugal), July 11-14 2010, MD-44, #4, p. 86 and TD-4 #3, p. 189.

Collective animal manure management simulation and environmental impact assessment

F. Guerrin & J.-M. Paillat
Cirad, UR 78 Recyclage & Risque
Reunion Island

This contribution deals with simulation modelling to help manage agricultural production systems. It describes the use of a Systems Dynamics complex model to simulating the functioning of pig slurry collective spreading plans in Brittany (Northwestern France), where intensive livestock farming has a well-known harmful environmental impact, namely on groundwater and coastal waters. The simulated plan involves 11 pig farms (encompassing both livestock and crops) located in a zone with excess slurry and 11 land owners located at about 40 km from the former. Individual pig farmers use part of their slurry to fertilise their own crops while they are regularly collected by collectively managed trucks to export their excess slurry to be applied on the remote crop farms.
The model dynamically simulates the slurry stock evolutions at the pig farms and the spreading fluxes on crops, both at the pig farms and the remote crop farms. It simulates also several indicators likely to assess the environmental impact of this spreading organization's functioning: gas emissions (ammonia, methane) at slurry storage and application, time/distance spent in slurry transportation and application, excess Nitrogen with potential water pollution risk. It shows also the interaction between the individual farm and the collective organization levels.